

What is claimed is

1. An antimicrobial ophthalmic lens comprising a metal salt and having a percent haze of less than about 200%.
- 5 2. The lens of claim 1 wherein the formula of the metal salt is $[M]_a [X]_b$ wherein X contains any negatively charged ion, a is ≥ 1 , b is ≥ 1 and M is any positively charged metal.
- 10 3. The lens of claim 2 wherein M is selected from the group consisting of Al^{+3} , Co^{+2} , Co^{+3} , Ca^{+2} , Mg^{+2} , Ni^{+2} , Ti^{+2} , Ti^{+3} , Ti^{+4} , V^{+2} , V^{+3} , V^{+5} , Sr^{+2} , Fe^{+2} , Fe^{+3} , Au^{+2} , Au^{+3} , Au^{+1} , Ag^{+2} , Ag^{+1} , Pd^{+2} , Pd^{+4} , Pt^{+2} , Pt^{+4} , Cu^{+1} , Cu^{+2} , Mn^{+2} , Mn^{+3} , Mn^{+4} , and Zn^{+2} .
- 15 4. The lens of claim 2 wherein M is selected from the group consisting of Mg^{+2} , Zn^{+2} , Cu^{+1} , Cu^{+2} , Au^{+2} , Au^{+3} , Au^{+1} , Pd^{+2} , Pd^{+4} , Pt^{+2} , Pt^{+4} , Ag^{+2} , and Ag^{+1} .
5. The lens of claim 2 wherein M is selected from the group consisting of Au^{+2} , Au^{+3} , Au^{+1} , Ag^{+2} , and Ag^{+1} .
- 20 6. The lens of claim 2 wherein M is selected from the group consisting of Ag^{+1} .
7. The lens of claim 2 wherein X is selected from the group consisting of CO_3^{-2} , NO_3^{-1} , PO_4^{-3} , Cl^{-1} , I^{-1} , Br^{-1} , S^{-2} and O^{-2} .
- 25 8. The lens of claim 2 wherein X is selected from the group consisting of CO_3^{-2} , NO_3^{-1} , Cl^{-1} , I^{-1} , and Br^{-1} .
- 30 9. The lens of claim 2 wherein M is silver and X is selected from the group consisting of CO_3^{-2} , NO_3^{-1} , Cl^{-1} , I^{-1} , and Br^{-1} .
10. The lens of claim 1 wherein the metal salt is selected from the group

consisting of silver nitrate, silver sulfate, silver iodate, silver carbonate, silver phosphate, silver sulfide, silver chloride, silver bromide, silver iodide, and silver oxide.

5 11. The lens of claim 1 wherein the metal salt is selected from the group consisting of silver nitrate, silver sulfate, silver iodate, silver chloride, silver bromide, and silver iodide.

12. The lens of claim 1 wherein the diameter of the metal salt particles is less
10 than about ten microns.

13. The lens of claim 1 wherein the diameter of the metal salt particles is equal to or less than about 200 nm.

15 14. The lens of claim 2 wherein M is silver and the amount of silver per lens is about 0.00001 to about 10 weight percent.

15. The lens of claim 2 wherein M is silver and the amount of silver per lens is about 0.0001 to about 1.0 weight percent.

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16. The lens of claim 2 wherein M is silver and the amount of silver per lens is about 0.001 to about 0.1 weight percent.

17. The lens of claim 1 wherein the lens formulation comprises etafilcon A,
25 genfilcon A, lenefilcon A, polymacon, aquafilcon A, balafilcon A, galyfilcon A, senofilcon A or lotrafilcon A.

18. The lens of claim 17 wherein the metal salt is silver chloride, silver iodide or silver bromide and the amount of silver present per lens is about 0.001 to
30 about 0.1 weight percent.

19. The lens of claim 1 wherein the molar solubility of the metal ion in water at about 25 °C is greater than or equal to about 2.0×10^{-30} moles/L to about less

than about 20 moles/L.

20. The lens of claim 19 wherein the molar solubility of the metal ion is greater than or equal to about 2.0×10^{-17} moles/L.

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21. The lens of claim 19 wherein the molar solubility of the metal ion is greater than or equal to about 9.00×10^{-9} moles/L to less than or equal to 1.0×10^{-5} moles/L when measured at 25°C.

10 22. An antimicrobial lens comprising a metal complex wherein the molar solubility of the metal ions in pure water at about 25 °C is greater than or equal to about 2.00×10^{-30} moles/L.

15 23. The lens of claim 22 wherein the metal ion is selected from the group consisting of Al^{+3} , Co^{+2} , Co^{+3} , Ca^{+2} , Mg^{+2} , Ni^{+2} , Ti^{+2} , Ti^{+3} , Ti^{+4} , V^{+2} , V^{+3} , V^{+5} , Sr^{+2} , Fe^{+2} , Fe^{+3} , Au^{+2} , Au^{+3} , Au^{+1} , Ag^{+2} , Ag^{+1} , Pd^{+2} , Pd^{+4} , Pt^{+2} , Pt^{+4} , Cu^{+1} , Cu^{+2} , Mn^{+2} , Mn^{+3} , Mn^{+4} and Zn^{+2} .

20 24. The lens of claim 22 wherein the molar solubility of the metal ion is greater than or equal to about 2.0×10^{-17} moles/L.

25 25. The lens of claim 23 wherein the molar solubility of the metal ion is greater than or equal to about 9.00×10^{-9} moles/L to less than or equal to 1.0×10^{-5} moles/L when measured at 25°C.

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26. A method of reducing the adverse events associated with microbial colonization on a lens placed in the ocular regions of a mammal comprising, placing an antimicrobial lens comprising a metal salt on the eye of a mammal.

30 27. The method of claim 26 wherein the adverse events are contact ocular inflammation, contact lens related peripheral ulcers, contact lens associated red eye, infiltrative keratitis, or microbial keratitis.

28. A method of producing an antimicrobial lens comprising a metal salt wherein the method comprises mixing the metal salt with lens components to make a lens formulation and forming the lens from said lens formulation.
- 5 29. A method of preparing an antimicrobial lens comprising a metal salt, wherein the method comprises, the steps of
- (a) mixing a salt precursor with a lens formulation;
 - (b) forming the lens with the product of step (a); and
 - (c) treating the lens with a metal agent.
- 10 30. The method of claim 29 wherein the salt precursor is soluble in a lens formulation at about 1 $\mu\text{g/mL}$ or greater.
31. The method of claim 29 wherein the salt precursor is selected from the
- 15 group consisting of tetra-alkyl ammonium lactate, tetra-alkyl ammonium sulfate, quaternary ammonium halides, sodium chloride, sodium tetrachloro argentate, sodium iodide, sodium bromide, lithium chloride, lithium sulfide, sodium sulfide, and potassium sulfide.
- 20 32. The method of claim 29 wherein the salt precursor is sodium iodide.
33. A method of preparing an antimicrobial lens comprising a metal salt, wherein the method comprises the steps of
- (a) mixing a metal precursor with an lens formulation;
 - 25 (b) forming the lens; and
 - (c) treating the lens with an anion precursor.
34. The method of claim 33 wherein the metal precursor is silver triflate, silver nitrate, copper nitrate, copper sulfate, magnesium sulfactate, or zinc
- 30 sulfate.
35. The method of claim 34 wherein the anion precursor is sodium bromide, sodium chloride, or sodium iodide.

36. A method of preparing an antimicrobial lens comprising a metal salt, wherein the method comprises the steps of

- (a) treating a cured lens with a salt precursor;
- 5 (b) treating the lens of step (a) with a metal agent under conditions to produce an antimicrobial lens having less than about 200% haze.

37. A method of preparing an antimicrobial lens comprising a metal salt, wherein the method comprises the steps of

- 10 (b) treating cured lens of with a metal agent.
- (b) treating the lens of step (a) with a salt precursor.

38. The lens of claim 1 having a haze value of less than 100% vs a standard CSI lens.

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39. A method of preparing an antimicrobial lens comprising a metal salt, wherein the method comprises the steps of

- (a) mixing a metal with a lens formulation;
- (b) forming the lens;
- 20 (c) treating the lens of step (b) with an oxidizing agent; and
- (d) treating the lens of step (c) with an anion precursor.

40. The lens of claim 18 wherein the lens formulation is selected from the group consisting of aquafilcon A, galyfilcon A, senofilcon A and the metal salt is silver iodide.

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41. The lens of claim 18 wherein the lens formulation is Lens B.

42. The method of claim 36, wherein the salt precursor is sodium iodide and the metal agent is silver nitrate.

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43. The lens of claim 1 having less than 150% haze.

44. The method of claim 29, 33, 36, 37 or 39, wherein said lens has less than 150% haze.